

## AMENDMENTS TO THE SPECIFICATION

Replace paragraph (0080) with the following replacement paragraph which is set forth below with markings showing the changes made relative to the immediate prior version:

**(0080)**        The stimulation delivered to the stimulating output electrode 76a or 76b from the stimulator 16 is a second form of electrical stimulation or Stim 2 electrical stimulation. Stim 2 electrical stimulation is delivered ~~as~~ in a monophasic or biphasic stimulation mode as a finite or complete cycle of electrical stimulation comprising a finite number of constant current (DC) square wave pulses. A waveform 78 representing a single complete cycle of monophasic Stim 2 electrical stimulation is shown in Fig. 11. Waveform 78 comprises a single group of pulses 79, each pulse 79 having a duration or pulse width A (time) and a level B (current amplitude). The group of pulses contains a preselected number or repetition E of pulses 79, with there being a delay C (time) between successive pulses. The complete cycle of monophasic Stim 2 stimulation depicted by way of example in Fig. 11 is shown as having five pulses 79. The pulses 79 are of the same phase and may be selected as being all positive (+) phase pulses, i.e. delivered from stimulating electrode 76b to stimulating electrode 76a in a positive monophasic mode as shown in solid lines in Fig. 11, or as all negative (-) phase pulses, i.e. delivered from stimulating electrode 76a to stimulating electrode 76b in a negative monophasic mode as shown in dotted lines in Fig. 11. Accordingly, positive pulses 79 are delivered in a first direction or polarity from the output stimulating electrode 76b to the return stimulating electrode 76a. Negative pulses 79 are delivered in a second direction or polarity from the stimulating electrode 76a, which then functions

as the output stimulating electrode or cathode, to the stimulating electrode 76b, which then functions as the return stimulating electrode or anode. The waveform 78 also illustrates the negative phase pulses selected as being of less current amplitude than the positive phase pulses.

Replace paragraph (0081) with the following replacement paragraph, which is set forth below with markings showing the changes made relative to the immediate prior version:

**(0081)** A waveform 80 representing a single complete cycle of biphasic Stim 2 electrical stimulation is shown in Fig. 12. Waveform 80 comprises two groups of pulses 79, with the second group of pulses 79 being separated from the first group of pulses 79 by an interval F (time). Each pulse 79 has a duration or pulse width A (time) and a level B (current amplitude), with there being a delay C (time) between successive pulses of each group. Each group of pulses contains a preselected number or repetition E of pulses 79, and the repetition E is the same for each group of pulses. As an example, the complete cycle of biphasic Stim 2 stimulation depicted in Fig. 12 has a total of four pulses, i.e. two pulses in each group. The groups of pulses are of different or opposite phase, one group of pulses 79 being positive phase pulses and the other group of pulses 79 being negative phase pulses. Fig. 12 illustrates in solid lines a first group of positive phase pulses 79 followed by a second group of negative phase pulses 79 in a positive leading biphasic mode. However, as shown in dotted lines in Fig. 12, a first group of negative phase pulses can be followed by a second group of positive phase pulses in a negative leading biphasic mode. The current amplitude B for the positive pulses is the same as the current amplitude of the negative pulses (equal

biphasic). Fig. 12 depicts the pulses of the dotted line waveform as being selected to have a level or current amplitude less than that of the pulses of the solid line waveform.

Replace paragraph (0082) with the following replacement paragraph, which is set forth below with markings showing the changes made relative to the immediate prior version:

(0082) As explained further below, initiating delivery of Stim 2 stimulation from the stimulator 16 requires ~~activation~~ actuation by the user completing performance of a multi-step manual actuation procedure with an activator for the stimulator 16. In response to ~~an activation~~ a multi-step manual actuation procedure completed by the user to start delivery of a Stim 2 stimulation cycle, the stimulator 16 delivers a complete cycle of Stim 2 stimulation in accordance with parameters or settings preselected by the user for the Stim 2 stimulation. The intraoperative neural monitoring system 10 is designed to provide Stim 2 electrical stimulation that may be selected by the user to have a duration A in the range of 100 to 500 microseconds and preferably 100, 250 or 500 microseconds, a level B ranging from 0-200 mA, max 750V compliance, a delay C in the range of 2 to 4 milliseconds and preferably 2, 3 or 4 milliseconds, and a repetition E of 1-8 pulses. For biphasic Stim 2 electrical stimulation, the interval F is a fixed, predetermined interval, preferably about 2 seconds. The stimulator 16 may be considered a high current stimulator of the intraoperative neural monitoring system 10. As explained further below, the touch screen 30 is used to select and/or adjust various parameters or settings for Stim 2 electrical stimulation including mode (monophasic or biphasic), duration A, level B, delay C and repetition E. Once ~~activated~~ actuated, the stimulator 16 will deliver the complete cycle of Stim 2 electrical stimulation, with

subsequent cycles of Stim 2 electrical stimulation being delivered by ~~reactivating~~  
reactuation of the stimulator.

Replace paragraph (0083) with the following replacement paragraph, which is set forth below with markings showing the changes made relative to the immediate prior version:

(0083)      ~~Activation~~ Actuation for Stim 2 stimulation may be accomplished via a button or other control option of the touch screen 30 serving as an activator for ~~simulator~~ actuating stimulator 16 as described below or remotely via the hand switch 18, illustrated in Fig. 13, serving as the activator. The hand switch 18 is connected to an electrical cable 82 carrying an electrical connector (not shown) that connects to the hand switch connector 38 on the power console 12. The hand switch 18 ~~serves~~ may be selected by the user as an the activator for the ~~simulator~~ stimulator 16 and includes an activation button 83 that is pressed twice to complete the ~~activation~~ multi-step manual actuation procedure and start delivery of Stim 2 stimulation from the stimulator 16. Pressing the button 83 once causes a dialog box to open on the touch screen 30. Pressing the button 83 a second time activates an acceptance button of the dialog box and effects delivery of a complete cycle of Stim 2 electrical stimulation from the stimulator 16. ~~Activation~~ Actuation can be canceled by pressing a "cancel" button of the dialog box prior to pressing the button 83 the second time. The button 83 must be pressed the second time within a predetermined time interval following the first press on button 83, and a preferred interval is about 0.1 to about 4.0 seconds after the first press. If the button 83 is pressed for the second time sooner than the predetermined time interval, the second press does not register and the button may be pressed again

within the predetermined time interval. If the button 83 is pressed after the predetermined time interval, the power console 12 will reset and the button 83 will again have to be pressed two consecutive times to effect delivery of Stim 2 stimulation. Two-step ~~activation~~ actuation as required by the hand switch 18 thusly ensures that Stim 2 electrical stimulation is definitively selected and confirmed prior to delivery of the electrical stimulus to the patient.

Replace paragraph (0097) with the following replacement paragraph, which is set forth below with markings showing the changes made relative to the immediate prior version:

(0097) The EMG monitoring display 143 has an "EMG Stim" box depicting the stimulation level (current amplitude) selected for Stim 1 electrical stimulation. The level is selected by pressing the "EMG Stim" box and then pressing the appropriate up or down coarse or fine adjustment arrow buttons to obtain a level from 0 to 30 mA. The "EMG Stim" box and the adjustment arrow buttons associated therewith provide a stimulation level selector or control option for the Stim 1 electrical stimulation delivered by the stimulating probe. The current level will typically be set to zero when Stim 1 electrical stimulation is not in use. When Stim 1 electrical stimulation is delivered to the patient using a monopolar or bipolar stimulating probe as described above, the "measured" current amperage delivered to the patient is displayed adjacent the "EMG Stim" box. Pressing the "0" button will reset the stimulus level to zero.

Replace paragraph (0098) with the following replacement paragraph, which is set forth below with markings showing the changes made relative to the immediate prior version:

(0098) An “event threshold” button of the EMG monitoring display 143 is used to adjust an event threshold of the monitoring system 10. The event threshold is enabled by an event threshold filter and assists in defining where monitored EMG activity becomes significant. EMG activity that exceeds the event threshold is considered an “event”, resulting in an audible event tone. The event threshold is adjusted by pressing the “event threshold” button and then pressing the appropriate up or down coarse or fine adjustment arrow buttons associated with the “event threshold” button. The “event threshold” button and associated adjustment arrow buttons provide a control option for the user to select or adjust the event threshold. The total adjustable range for the event threshold is preferably 20-2500 microvolts. The level of EMG activity selected as the event threshold, e.g. 100 microvolts as shown by way of example in Fig. 25, will be indicated on the EMG monitoring display 143. The “auto” button may be used as a control option to automatically adjust the event threshold to maximize EMG information. Where EMG activity has exceeded the event threshold for 10-20 seconds, for example, the event tones lose their usefulness and simply become noise. If “auto” is selected, this 10-20 seconds of EMG activity will be averaged and a new event threshold will be set. All EMG activity smaller than the new event threshold can be heard as raw EMG, while EMG activity greater than the new event threshold will generate event tones, thereby maximizing information and minimizing unnecessary noise.

Replace paragraph (0102) with the following replacement paragraph, which is set forth below with markings showing the changes made relative to the immediate prior version:

(0102) An MEP or Stim 2 monitoring display 153 is shown in Fig. 27 and is

accessed by pressing the “MEP” tab on the EMG monitoring display 143. The MEP monitoring display 153 is used when Stim 2 electrical stimulation is to be applied to the patient and comprises channel buttons, a waveform display area for displaying EMG activity detected by the monitoring electrodes for each monitoring channel in use, buttons for “event threshold”, “auto”, “event capture”, “largest”, “0”, “amplitude”, “time”, “freeze” and “save”, a volume control, and tabs for accessing additional displays as described above for the EMG monitoring display 143. The MEP monitoring display 153 may also include a “?” button for accessing a help display. ~~Similar to the EMG monitoring display 143, the~~ The MEP monitoring display 153 includes a stimulation level selector for the stimulator 16 comprising an “MEP Stim” button and coarse and fine adjustment arrow buttons associated with the “MEP Stim” button. The “MEP Stim” button displays displaying the selected level (current amplitude) for Stim 2 electric electrical stimulation, which is selected or adjusted by the user via the coarse and fine adjustment arrow buttons on the display 153, and which further includes an indicator showing “measured” amperage for delivered Stim 2 current. However, the The level for Stim 2 electrical stimulation is adjustable from 0 to 200 mA. If the selected stimulation level exceeds 30 mA, a dialog box will open requiring the selected level to be accepted or canceled. Pressing “0” resets the stimulation level to zero. An “activate” button of the MEP monitoring display 153 is pressed in order to initiate activation as the first step in a multi-step manual actuation procedure required to start delivery of Stim 2 electrical stimulation from the stimulator 16. Pressing the “activate” button opens a dialog box requiring the activation to be accepted or canceled as a second step in the manual actuation procedure. If accepted, a complete cycle of Stim 2 electrical stimulation will

be delivered from the stimulator 16. Accordingly, ~~activation~~ actuation via the touch screen 30 is implemented using an activator or control options of the touch screen, i.e. the “activate” button and the acceptance dialog box, and the activator is completed via operable or actuatable by a user completing performance of a two-step manual actuation procedure with the activator to start delivery of the Stim 2 electrical stimulation. Requiring completion of a multi-step manual actuation procedure to start delivery of Stim 2 electrical stimulation avoids ~~avoiding~~ erroneous or inadvertent ~~activations~~ actuations. Actuation of the activator to complete the ~~activation for simulator~~ actuation that starts delivery of Stim 2 electrical stimulation from stimulator 16 is effective to deliver a complete cycle of selected monophasic or biphasic Stim 2 stimulation from stimulator 16.

Replace paragraph (0104) with the following replacement paragraph, which is set forth below with markings showing the changes made relative to the immediate prior version:

**(0104)** An MEP Stim settings display 155 shown in Fig. 28 is accessed via the “MEP Stim” tab on the EMG settings display 151 and ~~is used~~ has control options for the user to select mode, pulse width, delay, repetitions and artifact delay for Stim 2 electrical stimulation. The MEP Stim settings display 155 is similar to the EMG settings display 151 but has a mode selector for stimulator 16 including a box or control option boxes for selecting the mode, i.e. of Stim 2 electrical stimulation to be delivered by stimulator 16 upon completion of the multi-step actuation procedure. The mode selector has settings selectable by a user prior to actuation of the activator for stimulator 16. The mode selector has a negative monophasic mode setting (“- only”) by



which the stimulator 16 is pre-set to deliver a complete cycle of monophasic Stim 2  
electrical stimulation in a negative monophasic mode (all pulses negative ("~~-~~ only")) or ;  
the mode selector has a positive monophasic mode setting (" + only") by which the  
stimulator 16 is pre-set to alternatively deliver a complete cycle of monophasic Stim 2  
electrical stimulation in a positive monophasic mode (all pulses positive ("~~+~~ only")) or ;  
the mode selector has a negative leading biphasic mode setting (" - = +") by which the  
stimulator 16 is pre-set to alternatively deliver a complete cycle of biphasic Stim 2  
electrical stimulation in a negative leading biphasic mode (negative pulses followed by  
positive pulses ("~~-~~ = +")) or ; and the mode selector has a positive leading biphasic mode  
setting (" + = -") by which the stimulator 16 is pre-set to alternatively deliver a complete  
cycle of biphasic Stim 2 electrical stimulation in a positive leading biphasic mode  
(positive pulses followed by negative pulses) ("~~+~~ = -")). The MEP Stim settings display  
155 also has a pulse width selector or control option operable by the user to set the  
pulse width, i.e. 100, 250 or 500 microseconds, for the pulses of Stim 2 electrical  
stimulation, a delay selector or control option operable by the user to set the delay, i.e.  
2, 3 or 4 milliseconds, between pulses of Stim 2 electrical stimulation, a repetition  
selector or control option operable by the user to select pulse repetitions, i.e. a group of  
1-8 positive or negative pulses in a monophasic cycle of Stim 2 electrical stimulation or  
a first group of 1-8 positive or negative pulses followed by a second group of the same  
number of pulses of reverse polarity in a biphasic cycle of Stim 2 electrical stimulation,  
and an activator selector or control option operable by the user to select hand switch  
operation actuation. The MEP Stim settings display 155 also has a filter button for  
adjusting the artifact delay as described above for the EMG Stim settings display 151,

although the artifact delay for MEP Stim (Stim 2) will typically be adjustable within a range of 1.0 to 16.0 milliseconds.